

VACUUMING MOTOR AND VACUUMING APPARATUS

BACKGROUND OF THE INVENTION

5 The present invention relates to a vacuuming motor
attached to a vacuum chamber and used as a drive apparatus
or the like of a board transporting robot or the like, and
a vacuuming apparatus.

As disclosed in JP-A-10-243609 (Japanese Patent
10 Application Publication Number: Hei10-243609), a conventional
vacuuming motor is used by putting a total of a drive portion
thereof in a vacuum environment constituted by a vacuum chamber.

In this case, for sealing inside of the vacuum chamber and
inside of the vacuuming motor, a clearance between a rotating
15 shaft thereof and a fixed portion of a housing or the like
is closed by using an expensive part of a magnetic fluid or
the like.

However, according to the vacuuming motor and vacuuming
apparatus of the conventional art, the following problem is
20 posed.

(1) A case of the vacuuming motor serves also as a
partition wall between the atmosphere and vacuum and therefore,
the case needs to strengthen more than necessary mechanical
strength. Therefore, a total of the vacuuming motor is enlarged
25 and heavy.

(2) Only a material or the like used in the drive portion

which is suitable for the vacuum environment can be used and therefore, the cost is increased. Further, the motor becomes a special order product and therefore, time is taken for fabrication thereof.

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SUMMARY OF THE INVENTION

The invention has been carried out in order to resolve the problem and it is an object thereof to provide a vacuuming
10 motor which is small-sized and the light-weighted at low fabrication cost, and a vacuuming apparatus with such vacuuming motor.

In order to resolve the above-described problem, according to the invention, in a vacuuming motor used by being
15 attached to a peripheral edge of a motor attaching hole provided at a vacuum chamber, an end portion on a load side of a motor main body is attached with a reduction gear main body having an attaching flange fixed to the motor attaching hole to interpose an O-ring therebetween and the attaching flange is fixed with
20 a vacuum seal constituted by a resin and brought into contact with an output shaft of a reduction gear for partitioning an inner space of the reduction gear main body and the motor main body and an inner space of the vacuum chamber.

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BRIEF DESCRIPTION OF THE DRAWING

Fig. 1 is a side sectional view of a vacuuming motor showing an embodiment of the invention, showing a state of being attached in a vacuum chamber.

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DESCRIPTION OF THE PREFERRED EMBODIMENT

An embodiment of the invention will be explained in reference to the drawing as follows.

10 Fig. 1 is a side sectional view of a vacuuming motor for showing an embodiment of the invention, showing a state of being attached to a vacuum chamber.

In the drawing, numeral 1 designates a vacuum chamber, numeral 2 designates a floor portion of the vacuum chamber, 15 numeral 3 designates a motor attaching hole provided at the floor portion 2, and numeral 4 designates a vacuuming motor comprising a motor main body 6 having a detector 5 and a reduction gear main body 7 attached to a front end portion of the motor main body 6. The reduction gear main body 7 includes an attaching 20 flange 8 at a load side thereof. The attaching flange 8 includes a seal holding portion 8a fixed with vacuum seals 9a and 9b respectively at vicinities of both end portions in an axial direction thereof and provided with a middle sucking port 10 for vacuuming air at an interval between the vacuum seals 9a 25 and 9b at a central portion thereof and a chamber attaching portion 8b in a ring-like shape attached to the seal holding

portion 8a or integrally formed therewith to be attached to a peripheral edge 3a of the motor attaching hole 3 of the vacuum chamber 1.

The vacuum seals 9a and 9b are constituted by a resin and brought into contact with an output shaft 7a of the reduction gear main body 7 at inner peripheral faces thereof for partitioning an inner space of the motor main body 6 and the reduction gear main body 7 and an inner space of the vacuum chamber 1. Numeral 11 designates a seal cover attached to the seal holding portion 8a.

The chamber attaching portion 8b of the attaching flange 8 is fastened to fix to the peripheral edge 3a of the motor attaching hole 3 of the vacuum chamber 1 by a bolt or the like, not illustrated. When the chamber attaching portion 8b is fastened to the peripheral edge 3a of the motor attaching hole 3, an O-ring 12 is inserted into a groove 3b in a ring-like shape provided at the peripheral edge 3a to thereby prevent a clearance between the peripheral edge 3a and the chamber attaching portion 8b from being brought about.

In such a constitution, inside of the vacuum chamber 1 is vacuumed as follows.

First, before starting to vacuum inside of the vacuum chamber 1, the interval between the vacuum seals 9a and 9b is vacuumed from the middle sucking port 10. Thereafter, inside of the vacuum chamber 1 starts to be vacuumed.

Thereby, both of the inside of the vacuum chamber 1

and the inside of the attaching flange 8 are vacuumed to make pressure uniform and therefore, pressure applied on the respective vacuum seals 9a and 9b, particularly, pressure applied on the vacuum seal 9a on the side of the vacuum chamber 1 can
5 be reduced.

Thereby, the vacuum seals 9a and 9b can withstand high vacuum.

In such a constitution, when the vacuuming motor 4 is driven, dust and dirt or the like is produced at inside
10 of the vacuuming motor 4, however, the inner space of the motor main body 6 and the reduction gear main body 7 and the inner space of the vacuum chamber 1 are partitioned by the vacuum seals 9a and 9b and therefore, dust and dirt or the like is not brought from the inside of the motor 6 and the reduction
15 gear 7 into the vacuum chamber 1.

Further, at outside of the vacuuming motor 4, the O-ring 12 is interposed between the peripheral edge 3a and the chamber vacuum portion 8b and therefore, there is not a clearance between the peripheral edge 3 and the chamber attaching portion 8b
20 and the atmosphere at outside of the vacuum chamber 1 is not brought from the portion of the peripheral edge 3a into the vacuum chamber 1.

As described above, according to the invention, the
25 following effect is achieved.

(1) The motor main body and the reduction gear main

body are arranged in the atmosphere, only a portion of the rotating shaft of the reduction bear main body is arranged in the vacuum environment and therefore, there is not a concern of discharging dust and dirt or the like from outer frame portions of the motor main body and the reduction gear main body into the vacuum environment. Therefore, the outer frame portions need not to strengthen more than necessary mechanical strength and a total of the vacuuming motor can be made to be small-sized and light-weighted.

10 (2) Also a material of the like used in the drive portion needs not to be suitable for the vacuum environment and therefore, the cost is reduced and time taken in fabrication thereof can also be shortened.

15 (3) Both inside of the vacuum chamber and inside of the attaching flange are vacuumed to make pressure uniform and therefore, pressure applied on the vacuum seal can be reduced and the vacuum seal can withstand high vacuum.